

## CLAIMS

What is claimed is:

1. A composite material comprising:
  - a matrix phase; and
  - a coupled fiber reinforcement structure formed of at least one high aspect ratio fiber wherein said coupled fiber reinforcement structure has an aspect ratio of less than ten.
2. The composite material of Claim 1 wherein the coupled fiber reinforcement structure comprises a pair of fibers adjoined by a bond, said joint structure capable of maintaining the cross structure during a molding process.
3. The composite material of Claim 1 wherein the multi-dimensional array forms a triangular structure.
4. The composite material of Claim 1 wherein the multi-dimensional array forms a square structure.
5. The composite material of Claim 1 wherein said coupled fiber reinforcement structure is formed by a first and second pair of parallel fibers, said first and second pair being coupled orthogonal to each other.

6. The composite material of Claim 1 wherein said fibers are selected from the group consisting essentially of carbon fiber, glass fiber, and kevlar.

7. The composite material of Claim 1 wherein said matrix is a thermosettable polymer.

8. The composite material of Claim 7 wherein the matrix material is a selected from the group of. epoxy resin, polyester resins, vinyl-ester resins, and phenolic resins.

9. The composite material of Claim 7 wherein the matrix material is a selected from the group of. polyimides, bismaleimides, and polybenzimidazoles.

10. The composite material of Claim 1 wherein said matrix is a thermformable polymer.

11. The composite material of Claim 10 wherein the matrix material is a selected from the group of. polycarbonates, polysulphones, polyether-ether-ketone and polyamides.

12. The composite material of Claim 1 wherein said coupled fiber reinforcement structure has an aspect ratio of less than five.

13. The composite material of Claim 1 wherein said coupled fiber reinforcement structure has an aspect ratio of about one.

14. The composite material of Claim 1 wherein said coupled fiber reinforcement structure has a height to width ratio of about one.

15. A coupled fiber reinforcement structure comprising:

a pair of fibers adjoined by a joint, said joint structure capable of maintaining the cross structure during a molding process; wherein said coupled fiber reinforcement structure has an aspect ratio of less than ten.

16. The coupled fiber reinforcement structure of Claim 15 is formed by a first and second pair of parallel fibers, said first and second pair being coupled orthogonal to each other.

17. The coupled fiber reinforcement structure of Claim 15 wherein said fibers are selected from the group consisting essentially of carbon fiber, glass fiber, and kevlar.

18. The coupled fiber reinforcement structure of Claim 15 wherein said coupled fiber reinforcement structure is formed by a first and second pair of parallel fibers, said first and second pair being coupled orthogonal to each other.